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***Beyond marine paper parks? Regulation theory to assess and address  
environmental non-compliance***

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## ABSTRACT

1. Many marine protected areas around the world are ‘paper parks. A key factor contributing to their ineffectiveness is non-compliance with the rules in place.

2. This paper contributes to the existing academic discussion on paper parks by originally drawing on critical regulation scholarship to develop a theoretical framework to assess and address compliance gaps in MPAs.

3. The theoretical insights are then explored using a case study of the second largest Italian MPA (the “Penisola del Sinis-Isola di Mal di Ventre”), employing a multi-disciplinary perspective built on both biological and socio-legal expertise.

4. The biological study consists in a review a number of existing unpublished data on biological resources in the MPA coupled with new analyses of the sea urchin fishery. The socio-legal research consists in the analysis of primary qualitative research in the form of semi-structured interviews conducted with key stakeholders at the local and regional level in 2014, followed by two workshops (one with stakeholders and one with the general public) in 2015 to discuss the research findings collectively and identify policy recommendations .

5. The results show that the Sinis MPA is not achieving its conservation goals, primarily because of actors’ non-compliance with the rules. The interviews with key stakeholders revealed a number of interlinked social, normative and calculative motivations at the basis of non-compliance. Policy solutions are then offered.

6. This study offers a novel analysis on paper parks that may be applicable to other MPAs experiencing similar compliance issues.

**KEY WORDS:** Marine Conservation and Policy, Marine Protected Areas, Paper Parks, Biological resources, Compliance, Regulation theory, Italy.

## **INTRODUCTION**

The designation of marine protected areas (MPAs) does not necessarily equate with effective management of human activities affecting the biological resources the areas host. The literature is full of examples of ‘paper parks’, i.e. designated protected areas that are not ensuring a high level of protection on the ground. The causes of ineffectiveness vary, ranging from poor compliance and enforcement levels, to the lack of regulations all together, to lack of staff or management authorities (e.g. Jameson *et al.*, 2002; Mora *et al.*, 2006; Guidetti *et al.*, 2008; Rife *et al.*, 2013; Advani *et al.*, 2015). Academics have proposed a range of solutions to address the problem of paper parks. This article contributes to the academic discussion by originally drawing on key insights of critical regulation literature to develop an analytical framework to both investigate and address cases of MPAs where there are compliance gaps with regulations in place. Critical regulation theory is an under-explored theoretical field in studies of MPA governance but it has great potential to produce an in-depth analysis of compliance issues related to environmental management. Indeed, in pluralizing compliance by identifying and mapping the range of factors at the basis of actors’ behaviour towards regulation, this theoretical framework uncovers the complexity of compliance and its relation to regulation, producing a more holistic picture.

After introducing the theoretical and analytical framework, the paper applies it to a case study of an Italian MPA. The MPA chosen for this study is an intensively used

MPA for both commercial (fishing fleet comprising 94 boats and 199 fishers; see Casola *et al.*, 2014) and recreational (196 personal licences were released for 2015) fishers. The MPA is also of high biodiversity importance, as acknowledged by the fact that it has been included in the list of Specially Protected Areas of Mediterranean Importance (SPAMI) (Decision IG 20/7 of the COP 17 of the Barcelona Convention) and it hosts a Special Area of Conservation and Special Protection Area respectively under the Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and under Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 (Wild Birds Directive).

Findings from over 10 years of biological research in the area show that the MPA is not achieving its biological conservation objectives because of uncontrolled human exploitation. Sixteen semi-structured interviews in May 2014, followed by two stakeholder workshops in April and May 2015, were carried out to consider the various motivations at the basis of stakeholders' non-compliance with the regulations of the MPA and to identify ways to overcome these shortcomings. The paper aims to show the value of multi-disciplinary collaborative research in detecting the biological ineffectiveness of MPAs and the socio-legal reasons behind such failure. In doing so, it shows the value of comprehensive analyses that consider the interrelationship between a key number of biological and social variables.

**THEORETICAL FRAMEWORK**

## **Paper parks and regulation theory**

MPAs, from the designation process to management and enforcement, require that attention is paid not only to environmental issues, but also to the human dimension since social, economic, and institutional factors can dramatically affect their effectiveness (Charles and Wilson, 2009). Inappropriate planning, poor governance, low enforcement level, few socio-economic incentives for compliance, conflicts among stakeholder groups and little community involvement in the management are identified in the literature as key obstacles limiting conservation effectiveness of MPAs (e.g. Bruner *et al.*, 2004; Ferse *et al.*, 2010; Fenberg *et al.*, 2012; Rife *et al.*, 2013; Advani *et al.*, 2015). Therefore, despite the overall documented success of MPAs as a tool for marine conservation and fisheries resource restoration (e.g. Agardy, 1994; Halpern and Warner, 2002; Branch and Odendaal, 2003), studies have demonstrated that management objectives are not always met in a substantial number of cases study, effectively rendering MPAs paper parks (e.g. Rife *et al.*, 2013; Advani *et al.*, 2015). For Italian MPAs, as for MPAs in many other countries in the world (e.g. Walmsley and White, 2003; Byers and Noonburg, 2007; Rodríguez-Martínez, 2008; García-Gómez *et al.*, 2010; Edgar *et al.*, 2011), the lack of effective surveillance of MPAs is considered one of the greater handicaps, inhibiting success. Only those Italian MPAs with strong surveillance and enforcement mechanisms showed positive ecological responses, as demonstrated by Guidetti *et al.* (2008). The reasoning is that, in a MPA subject to proper surveillance, actors will comply because they fear detection of violations and subsequent sanctions. Enforcement acts as a deterrent and pushes actors to comply with the management rules, thus having a positive impact on conservation regulations' outcomes. This view is clearly rooted in classical deterrence

theory, where the regulatees (in this case fishers) are self-interest utility maximizers who will comply because the fear of detection of wrongdoing, coupled with the amount of the penalty outweighs the benefits of non-compliance.

A more recent study of a Sardinian MPAs has identified other causes leading to compliance with MPAs' rules (Micheli and Niccolini, 2013). The study demonstrates that the MPA of "Tavolara - Punta Coda Cavallo" is a "superperformer" despite very low surveillance levels. Good leadership by the director of the MPA and his ability to involve various partners in collaborative decision-making decisions are the factors enabling success in this case study (Micheli and Niccolini, 2013). However, although academic discussions of Italian MPA effectiveness are moving beyond issues of surveillance and classical deterrence theory, up to the present moment no multidisciplinary study has been carried out to understand and explain the complex range of factors determining compliance with MPAs regulations and linking compliance motivations with MPA effectiveness in Italy, despite the fact that MPAs are increasingly recognized and analysed as complex social-ecological systems worldwide, demanding an multi-disciplinary approach (e.g. Espinoza-Tenorio *et al.*, 2010; Pollnac *et al.*, 2010; Bergseth *et al.*, 2015).

Indeed, there have been many studies worldwide exploring the nature and best practice of MPA governance (Christie and White, 2006), focusing on the importance of collective action. In fact, considering the nature of the marine environment as a common pool resource<sup>1</sup> and the related lack of a clear-cut property right regime, MPA governance is highly challenging and neo-institutional scholars have drawn on and extended Ostrom's

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<sup>1</sup> Common Pool resources are subtractable resources where it is difficult to exclude users as defined in the Digital Library of the Commons at: <https://dlc.dlib.indiana.edu/dlc/contentguidelines>

well-known design principles<sup>2</sup> for long-enduring commons (Ostrom, 1990) to the sea (e.g. Christie *et al.*, 2003; Mascia, 2003 ), and have emphasized the importance of small-scale place-based management (Young *et al.*, 2007) and the importance of local stakeholders' participation in decision-making (Jentoft *et al.*, 2007).

However, Jones (2014) argues that there has been a reluctance in some of these studies to fully consider the potential that state based regulation can offer, focusing primarily on 'people and civil society' (Jones, 2014). Jones' aim is to provide a more rounded view of governance re-inserting the role of the state and the law in the picture. Drawing on 20 case studies from around the world, he builds a framework based on five categories of incentives (economic, interpretative, knowledge, legal and participative) to constitute an effective governance system. Economic incentives include, inter alia, green marketing, property rights, diversification, compensation; interpretative incentives include education, awareness raising and the role of media, knowledge incentives include collective learning, increasing scientific certainty etc, legal incentives include enforcement, legal interventions, role of authorities etc. and finally participative incentives include participation on decision-making, respect for local traditions, promotion of equity etc. In most of the MPAs reviewed by Jones, legal incentives are the key to improve the governance system because they are the supportive factor for the other categories of incentives (i.e. law can support the development of other incentives by for

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<sup>2</sup> Ostrom's design principles are as follow: 1. Clearly defined boundaries defining who has rights to withdraw resources and the boundaries of the common resource; 2. Congruence between appropriation and provision rules and local conditions; 3. Collective-choice arrangements; 4. Monitoring of conditions and behaviour; 5. Graduated sanctions depending on the seriousness of an offense; 6. Conflict-resolution mechanisms; 7. Minimal recognition by government authorities of rights of appropriators to organize; 8. Nested enterprises with monitoring, enforcement and governance activities organized in multiple levels for CPRs that are part of larger system have promoted small-size, place-based governance.



example attaching legal conditions to the development of property rights, operating as an economic incentive).

However, the law and consequently legal incentives are associated with the state and top-down mechanisms. Indeed, the call for legal incentives is used by Jones (2014) to criticize neo-institutional approaches, which push towards self-governance by local actors neglecting completely “the need for top-down approaches and legal incentives” (Jones, 2014). According to Jones, bottom-up and top-down approaches need to be complementary. If this is in line with classical co-management literature (see Pinkerton 1989, Berkes and Preston 1991, Pomeroy and Berkes 1997), Jones’ view of law as top-down, state derived only is one which critical regulation scholarship has long criticised, questioning the assumption that the state is the only locus for the development of the law and that it retains the final authority. Critical regulation scholars have spoken of ‘decentred’ regulation (Black, 2001) showing that there are multiple regulatory sites. The state is therefore not the only regulator and not always positioned at the top. Concentrating on the relationship between the state and other actors and institutions, these scholars have demonstrated the complex and fragmented nature of regulation (fragmentation of power and knowledge) (Black, 2001; Scott, 2004). These insights have clear implications for studies of compliance and enforcement. Indeed, the repositioning of the state-based regulation within a complex web of actors and institutions blurs the simple hierarchical relationship between regulators as state agencies and regulatees.

This article attempts to draw on critical regulation scholarship to discuss the compliance gap in MPAs, showing that the meaning and operation of MPA regulation is extremely complex and varied, it is dependent on actors’ perspectives and actions, and it

argues that such complexity needs to be understood and analysed before providing effective solutions to MPA governance.

### **Non-compliance motivations**

There is a rich and diverse literature on compliance (see for example Hawkins 1989, Kuper and Sutinen 1998 and the contributions of Parker and Nielsen 2011 edited collection). This literature shows that a key independent variable affecting compliance is actors' motivations.

As Parker and Nielsen (2011) argue, analyses have increasingly showed the way in which non-compliance cannot be simply explained by actors' attempts to maximize their economic or material utility. This is because, as Ayres and Braithwaite (1992) put it, actors have "multiple selves" and are not only rational appropriators pursuing self-interest. Actors are moved by various types of compliance motivations. If cost-benefit calculations are likely to play a role in shaping actors' behaviour, normative and social motivations cannot be discounted (Gunningham *et al.*, 2003; Tyler, 2006). Normative motivations refer to actors' perceptions of the legitimacy of a regulatory system, i.e. the extent to which actors' normative frameworks coincide with those of the regulatory system in force. Social motivations refer to pressures towards particular behaviours exercised by the social groups and culture to which the actors belong (Winter and May, 2001; Nielsen and Parker, 2012). Moreover, these motivations interplay and are entangled in different ways.

Explaining and mapping actors' motivations is a fundamental prerequisite for providing policy recommendation, and regulation theory can assist us in this task. Work

by Baldwin and Black on “really responsive regulation” (Baldwin and Black, 2008), argue that to ensure compliance in complex environments, regulators need to be really responsive to the regulatees’ compliance behaviour and to their cognitive and operating frameworks, to the diversity of regulation tools and strategies, to the broader institutional environment, to the performance of the regime, and to changes in all the above, developing a dynamic and adaptive approach to regulation.

Baldwin and Black (2008) is an important contribution in pointing to regulatory challenges and wider contextual variables affecting non-compliance but the authors are speaking to good-will regulators, not considering cases in which regulators are themselves part of the problem by acting in a suboptimal manner. As regulatees may be driven by mixed compliance motives (normative, social and calculative) so too regulators are human beings, having particular biases. The literature on regulatory capture considers exactly these types of situations. Regulatory capture occurs in cases in which “regulation, in law or application, is consistently or repeatedly directed away from the public interest and toward the interest of the regulated industry” (Kwak, 2014). However, there is danger in the classical regulatory capture literature to consider the regulator only as a rational actor, aiming to maximize his/her self-interest, moved therefore solely by short-term political gains. More recent accounts of regulatory capture scholarship show that the suboptimal performance of regulators may be also attributed to reasons other than material self-interest (therefore non-calculative reasons). Regulators, as much as regulatees have “multiple selves”. In this context, for instance Hanson and Yosifon (2003) have spoken of ‘deep capture’ to consider non-rational influences as causes of captures

and Kwak (2014) has coined the term ‘cultural capture’ to discuss situations in which regulators’ behaviour is shaped by factors other than material self-interest.

There are a number of strategies considered by regulation literature to address the capture problem and improve the regulatory outcomes, including the consideration of counter-arguments, the employment of independent agencies to represent other viewpoints forcing regulators to justify their position and reflect on their cultural biases (Kwak, 2014), and the increase of transparency and accountability measures (Lodge, 2004). In this paper Lodge’s definitions of transparency as making “regulatory activities access-and assess-able” and of accountability as “the obligation to account for regulatory (or any other type of) activities to another body or person” are adopted (Lodge 2004). Dimensions of transparency and accountability are multiple relating to the decision-making process in setting standards, to the rules followed, to the activities of the regulatees, to the controls exercised on regulates, and to the feed-back processes. Three different administrative doctrines can be identified pointing to different strategies to tackle these dimensions: the “fiduciary trusteeship” doctrine (focused on technocratic decision-making), the “consumer sovereignty” doctrine (focused on competition) and the “empowering citizens” doctrine (focused on participatory decision-making) (Lodge, 2004). According to Lodge (2004) ,the “empowering citizens” doctrine seems to avoid the risks of the other two by putting the accent on information, to be publicly scrutinized and on the contribution of lay people to regulatory decision-making. However, elite capture of the participatory process can occur (Stack 2014).. Stack (2014) showed that, based on a wide range of empirical studies on US rulemaking, business interests tend to make wider use of participation rights compared to other groups resulting in “a paradox

of process” whereby “participatory rights are conceptually fundamental to administrative legality but end up substantively shaping regulation in predictable and private-regarding ways”.

To minimize regulatory capture, the “empowering citizens” doctrine suggests oversight through local lay-participation. This is likely to reduce the social distance between the public, those directly affected by the regulated activities and the regulators. However, the success of such an oversight body is dependent on the willingness of the public and stakeholders to participate in it, and may ignore instances in which cultural inertia is rooted in the wider society and instances in which the participatory process is dominated by particular elites. In these cases, independent oversight bodies may be a preferred solution.

To sum up, in order to analyse and address the compliance gaps rendering MPAs little more than paper parks from a critical regulation perspective, the various motivations at the basis of regulators and regulatees non-compliant behaviour must be first all of all detected and then internalised by the regulatory system. In so doing a really responsive regulatory system can be produced where regulatory capture is minimized, enhancing the legitimacy, transparency and accountability of the system. These theoretical insights are explored below in the context of an Italian MPA, the Penisola del Sinis-Isola di Mal di Ventre MPA (hereafter Sinis MPA).

## **INTRODUCTION TO THE CASE STUDY AND METHODS**

### **Study area: the Sinis MPA**

Sinis MPA (Figure 1), established in 1997 (Decree 12/12/1997), is the second largest MPA in Italy. It covers about 25000 ha and more than 30 km of coast. The MPA is subdivided into different zones with different degrees of protection that have undergone changes through time mainly due to socio-economic reasons (Figure 2).

Like many other Italian MPAs, the Sinis MPA is managed by the Local Authority (Cabras Local Authority), with the Mayor acting as the MPA President. The local fishing fleet, composed of 94 boats and 199 commercial fishermen (Casola *et al.*, 2014) and recreational fishers (196 personal licences issued in 2015) is one of the biggest in the Italian MPAs. The day to day management of the MPA is carried out by the Director, nominated and appointed by the Local Authority's Mayor for a duration of three years. As the appointment is by nomination, if the Mayor is not re-elected the Director also cannot continue to hold his/her role, unless they are re-appointed by the new Mayor. At present, the Director is supported by one member of staff with a fixed-term contract and four part-time assistants, funded by external projects (personal communication with the Director, June 2015). Enforcement powers are shared among the Port Authority, the Local Police and the Forestry Police (Decree 20/07/2011, n. 188). The management body is supported by a Commission (known as "Commissione di Riserva") that provides expert advice regarding planning and management choices, as required by national legislation (Act 979/1982, 28 as amended by Act 426/1998, Art 2(16)). The Commission does not have statutory powers as its role is primarily consultative. Its members include representatives of the Environmental Ministry, of the Port Authority, of the Region, of the Local Authority, of environmental bodies and cultural associations.

The normative framework of the Sinis MPA is a fragmented but inclusive one, consisting of a number of decrees, ordinances and regulations. Next to the decrees related to the designation of the MPA, fishing and other sea-users activities within the MPA are regulated through a series of ordinances issued by the Port Authority (see: <http://www.guardiacostiera.it/capitanerieonline/ordinanze.cfm?id=72>, last accessed 29 August 2015) and fishing activities are regulated through a number of decrees issued by the Agricultural Department of the Region (Decree 20/07/2011, n. 188 listing all the activities that are allowed to be carried out in the different Zones of the MPA). Article 6 of the Decree 20/07/2011, n. 188 also requires the Environmental Ministry to adopt the MPA Regulation proposed by the management body after consulting the MPA Commission. This must happen not later than 180 days after the entry into force of the Decree 20/07/2011, n. 188. The MPA Regulation has the potential to streamline the regulation of the MPA as there no longer will be the need to issue all these separate ordinances regulating sea-users activities. However, the MPA Regulation has not been adopted yet despite the deadline having expired.

### **Methods**

An initial literature review of all available material and the analysis of raw data held by the MPA's offices were undertaken to assess the conservation effectiveness of Sinis MPA. This review, and in particular the consideration of gray literature and the analysis of raw data, has been fundamental to define the conservation level of local biological resources and has provided the biological base for the following socio-legal study. In fact, if only published literature had been considered (i.e. Guidetti et al., 2008; Coppa et al.,

2012, 2015) no strong evaluation on this topic including temporal trends could have been carried out (only Coppa et al., 2015 included temporal dynamics analysis). Regarding the raw data, it was decided to analyse those referring to the commercial sea urchin *Paracentrotus lividus* being one of the most intensely exploited invertebrates in Sardinia (Pais et al., 2012 and literature therein) and because of a wide availability of spatial and temporal data. A third reason for the choice of *P. lividus* is the existence of more restrictive rules governing its exploitation inside the MPA (e.g. only fishing without breathing apparatus is allowed and fishermen have lower personal quotas compared to outside; see Decree 28/10/2014, n. 1553 for more details). In fact we found that from 2003 several sampling campaigns were conducted in the Sinis MPA to define its distribution (according both to habitat type and depth), to provide scientific suggestions in order to improve fishery regulation and management (e.g. based on stock assessment, catch data analysis, gonadal-somatic index variations) and to evaluate the reserve effect (i.e. testing if density and mean size are higher inside the MPA than outside) or the cascade effect (i.e. study on the relationships among algae, sea urchins and their predatory fishes). All the databases coming from the previous studies described above (e.g. Facheris, 2004; Baroli et al., 2005; Baroli et al., 2007; Coppa et al., 2010a, 2014; Wrachien, 2011) were grouped together and reexamined comparing the values of the sites monitored in the same season (summer) and depth range (<5m) in the majority of sampling campaigns to analyse the population trend within the MPA and the effectiveness of protection measures (comparing different zones of the MPA to outside). Five sites in 5 years (2004, 2005, 2007, 2010, 2012) with 4 replicates (5 m<sup>2</sup>) were analysed to describe the population trend within the MPA, whereas the assessment of the reserve effect was



based on 3 years samples (2005, 2010, 2012) with a total of 6 matching sites (2 per protection level with 3 replicates). Multifactorial analyses of variance (ANOVA) were applied to check for any significant differences in the total population density or in the stock fraction (individuals >5 cm) according to times and/or protection level. Cochran's test was used to test for the homogeneity of variances and data were transformed when necessary (Underwood, 1997). Post hoc comparisons, by mean of the Student–Newman–Keuls (SNK) test, were carried out in case of significant differences from ANOVA. These analyses will help to improve the picture of the state of biological resource in the Sinis MPA which is based on more than 10 years of scientific data collection.

To investigate the socio-legal causes at the roots of the biological results, 16 semi-structured interviews were conducted with key stakeholders in May 2014 (see Appendix A and B for questionnaires). A purposive sampling strategy was employed to select the interviewees because the aim was not to use a random sample to generalize at the level of the population but to learn from key stakeholders. A maximal variation approach was followed whereby researchers sample individuals who differ in key characteristics. Interviewees were chosen because they held prominent positions within their sector and/or had extensive knowledge of the MPA. As the aim of the study was to investigate the governance reasons behind the ineffectiveness of the Sinis MPA, it was decided that both regulators and sea-users should be interviewed. The sea-users were primarily fishermen, both commercial and recreational, because their activities are the most impactful on the MPA. Other external factors, such as current tourism rates are low and therefore of negligible impact (Camedda et al., 2015) and there are projects aimed at

increasing levels of eco-tourism (see projects "S&T Med" and "MEET"). The sample comprised:

- 8 sea-users (of which 2 carrying out recreational fishing with tourists (known as "fishing tourism"), 2 representatives of recreational fishermen, 2 commercial fishermen and 2 representatives of recreational associations).
- 8 regulators (2 representative of the management body, 2 representatives of neighbouring local authorities hosting important access sites to the MPA, 2 enforcement bodies and 2 representatives of the environmental department of the Sardinian Region).

The interviews' results were discussed with the interviewees and with the local public in two workshops conducted on the 29<sup>th</sup> of April 2015 and 6<sup>th</sup> of May 2015. The workshops were an important opportunity to discuss ways forward, therefore testing and refining the policy directions.

## RESULTS

### Conservation effectiveness of the Sinis MPA

Coastal fish fauna, including many commercial species, represents one of the most common indicators of MPA effectiveness (e.g. Micheli *et al.*, 2004; McClanahan *et al.*, 2007; Guidetti *et al.*, 2010; Consoli *et al.*, 2013; Maggs *et al.*, 2013). A study by Guidetti *et al.* (2008) on Italian MPAs demonstrated that the pattern of recovery of target fish was strictly related to levels of surveillance and that only 20% of the sampled MPAs had adequate levels. This study investigated 15 MPAs between May 2002 and October 2003, and Sinis MPA was one of the six “paper parks” (Guidetti *et al.*, 2008). A subsequent study by Marra *et al.* (2016) on fish fauna in Sinis MPA analysed the recovery trends of commercial species 7, 10, 13 and 15 years after designation by means of visual census technique (see García-Charton *et al.*, 2000 for more details on this technique). The low conservation effectiveness of the MPA was confirmed by the lack of an increasing trend of protection across the years inside the MPA as well as a lack of diversification in fish size and biomass between protected and unprotected sites and among different protection levels (zonation effect) (Marra, 2016). Also the mean fishing yield evaluated by Guidetti *et al.* (2012, 2013), using both landed catch data and fishermen interviews, resulted lower in comparison with other Italian case studies and revealed that the management of commercial fisheries in Sinis MPA was not sustainable. Finally, the new analysis on the temporal trend of the sea urchin *Paracentrotus lividus* showed that the population within Sinis MPA has suffered a significant decrease of *P. lividus* between 2007 and 2010 (Figure 3A). The decreasing trend was even more marked when considering the

commercial sizes (74% reduction in resource availability in 8 years); the analysis of the variance showed two cases of significant stock contraction: the first between 2004 and 2005 and a second starting from 2010 (Figure 3B). The comparison between areas with different fishing regulations through years (two-way ANOVA: only the single factors "year" and "protection" were significant, not their interaction) showed no difference between inside and outside the Sinis MPA with the exception of the Zones B (no take area of *P. lividus* according to an interim order of the Port Authority (n.58/2014)) where density values of *P. lividus* were significantly higher (Figure 3 C). Despite the negative trend shown in Figure 3B, sea urchin stock was always higher within the MPA (also in zone C, where fishing is allowed) than outside the MPA (Figure 3D). Therefore, a slight reserve effect due to the more restrictive fishing regulations within Sinis MPA was found although by itself insufficient to reverse the overall negative trend.

The ineffectiveness of Sinis MPA can be demonstrated also by considering the status of the protandric limpet *Patella ferruginea* (Coppa *et al.*, 2012, 2015), the most endangered invertebrate of the Mediterranean Sea protected under Annex II of Berne Convention, Annex II of the 1995 Protocol concerning Mediterranean Specially Protected Areas and Biological Diversity in the Mediterranean to the Barcelona Convention, and Annex IV of Habitat Directive. In the first census, carried out in 2009, a detailed map of the distribution of *P. ferruginea* in the Zone A of Mal di Ventre Island was provided and the main constraints for the population spread identified (Coppa *et al.*, 2012). Illegal catches were the main cause for the low population density (0.02 ind/m) and the absence of large females (>80 mm), even though the study was conducted in the no take-no entry Zone of Sinis MPA (Coppa *et al.*, 2012). Further research between 2009 to 2013,

investigated the effect of poaching on the distribution of *P. ferruginea* in Mal di Ventre Island evaluating the influence of site accessibility and legal protection (according to MPA zonation), thus assessing both the spatial pattern of illegal harvesting and the degree of effectiveness of the MPA (Coppa *et al.*, 2015). It was demonstrated that the decrease in population density and size occurred initially in the easily accessible sites in Zones C and B and then in the no take area of Mal di Ventre Island. Currently, harvesting has also moved onto the semi-accessible coast and it is likely that it will spread progressively, first in areas that are most easily accessible and then to areas with stricter legal controls. The population viability analysis predicted that the population is likely to be extinct within ten years if current rates of harvesting are maintained (Coppa *et al.*, 2015).

There were some positive effects of the MPA on the population trend of *Pinna nobilis*, the largest bivalve of the Mediterranean Sea, protected under Annex IV of the Habitats Directive and Annex II of the 1995 Protocol concerning Mediterranean Specially Protected Areas and biological diversity in the Mediterranean to the Barcelona Convention. This sessile suspension feeder lives mainly on soft sediments colonized by seagrass meadows. Sinis MPA and particularly the Gulf of Oristano, is characterized by an extensive area of *Posidonia oceanica*, that appears to be a suitable area for the growth of *P. nobilis* (e.g. Coppa *et al.*, 2010, 2013; Coppa, 2011). Thanks to several awareness-raising campaigns and to the protection measures in place, the dynamics of the local population seem to be driven more by biotic and abiotic features (e.g. food availability, bottom current direction and speed, *P. oceanica* distribution and characteristics) than by anthropogenic pressures (e.g. illegal fishing, anchoring, impact of trawling/gillnets/pots) (Coppa *et al.*, 2010, 2013; Coppa, 2011). In fact, to protect the *P. nobilis* population and

its habitat, since 2005 the MPA authority installed free buoy fields in all the principal sheltered bays within the MPA (Coppa, 2011). Therefore, for many years, these mooring structures have largely contributed to minimizing the impact of anchoring on the sea bed (Coppa, 2011). A significant increase in population density was observed between 2009 and 2014 that could be attributed in part to the enlargement of the MPA of 2011 (Camedda *et al.*, 2015; Figure 2). Encouraging results can be derived also from the analysis of the conservation level of sandy beach ecosystems along the Sinis Peninsula: relevant erosion phenomena were never detected and the human impact of on beach habitats resulted not significant (De Falco *et al.*, 2003, 2008; Simeone and De Falco, 2012; Simeone *et al.*, 2012, 2013). Technical reports on sandy beaches attribute their good conservation status to measures put in place by the Sinis MPA (Simeone *et al.*, 2005; Camedda *et al.*, 2015).

Thus, the general conclusion based on the various biological studies is that Sinis MPA has been ineffective for the recovery and management of commercial biological resources, nor for the conservation of protected endangered species, especially those colonizing easily accessible sites. This raises questions regarding the levels of legal compliance and enforcement that exist (Guidetti *et al.*, 2008, 2012, 2013; Coppa, 2011; Coppa *et al.*, 2012, 2015; Marra, 2016). These questions were the starting point for the socio-legal research, structuring the interviews with key stakeholders.

### **Explaining and mapping non-compliance motivations**

To provide an in-depth analysis of compliance motivations, the interview transcripts were analysed with the tripartite distinction of compliance motivations in mind (calculative,

social and normative), extrapolated from regulation theory. It is worth noting that the separation of compliance motivations into three categories is a useful heuristic device to show the complexity of stakeholders' behaviours and perceptions and a useful tool to analyse interviews, though there are causal relations between issues that cross-cut motivation categories (Figure 4). Considering that regulators also behave in a suboptimal manner, this analytical framework has been used not just to explain and map regulatees' (in this case sea-users) non-compliance motivations but also regulators' non-compliance motivations, thereby adding to existing compliance studies that focus on regulatees motivations only.

Because many of the issues emerging are sensitive, to maintain the anonymity of the research participants, direct quotes from specific interviewees are attributed either to "sea-user" or to "regulator" using a numbered system to distinguish between them.

#### *Regulators' social motivations*

When asked specific questions related to environmental regulations or the ecological status of the MPA, not all regulators knew the answer. For example, one representative of an enforcement body (Regulator 5) had no knowledge of the process of designation of the MPA, no clear perception of the conservation status of the MPA and no administrative expertise needed for the role. This was due to two main interrelated factors. On the one hand, the regulator had taken on this role only recently, having held previously a different, non-administrative position within that enforcement body in another region of Italy, so he could not build on previous expertise. On the other, however, the regulator had not attempted to familiarise himself with the regulations and understand local

ecological conditions, showing cultural passivity. This is not an isolated case as many sea-users lamented regulators' unwillingness to exercise their powers and duties, attributing it to passivity, cultural inertness, indolence and apathy, in a word, "inertia".

"It is not lack of capacity but lack of willingness to intervene. I do not know why there is such lack of willingness, I do not think it is a matter of corruption but surely inertia" (Sea user 1).

It is fair to say that such inertia however, was not a common characteristic of all regulators. Some stressed their willingness to participate in all the meetings related to the drafting of the Regulation in order to understand the perspectives of all stakeholders and find common grounds for collaboration (Regulator 1 and Regulator 2) and four out of the eight regulators interviewed were well versed in environmental law.

#### *Regulators' Normative motivations*

If the opinions of the regulators regarding the management rules in place were overall positive, their assessment of the application and concrete weight of regulations was far more negative. A series of themes emerged, related to both regulatory, procedural, and substantive aspects, namely 1) institutional fragmentation, 2) politicization of administration, 3) the existence of a black market, and 4) enforcement gaps. All regulators criticized the lack of institutional coordination and cooperation existing at various decision-making levels: between local enforcement bodies and between the agriculture department (having fisheries competences) and the environment department at the regional and national level (having conservation competences). The institutional fragmentation was primarily attributed by regulators to the politicization of the



administrative system in Italy and Sardinia in particular. Such politicization was considered to be a driving force behind environmental governance decisions and therefore extremely difficult to eradicate. Interviewees criticized the lack of separation between technical and political decisions, most evident in assigning all the MPA's managerial powers to one local authority rather than an association of local authorities or to an independent scientific body, as is possible under the national legislation (Regulator 1 and Regulator 2). However, a counter argument was raised centred on the fact that having a local authority as the manager renders the decisions more legitimate, as the local authority is the embodiment of a democratic process and therefore more capable of balancing the particular interests of different stakeholders with the public interest. Operating alone, instead of in association with neighbouring local authorities, was considered optimal to speed decision-making by one regulator (Regulator 6), while others argued that an association of local authorities would be a better solution considering that points of access to the MPA are also located in neighbouring local authorities.

Regulators also argued that many fishermen continue to fish illegally because of a black market. The official fish market is today a large, empty space that had to close down because it was not used by fishermen to sell their products as some restaurants and private households were buying the fish at a reduced price directly from the fishermen.

Regulators pointed out that criminal sanctions had never been applied and that peoples are aware of the low levels of inspection and enforcement activities. Here it is important to recall the findings of the biological studies because in the case of protected species not only criminal but also administrative sanctions have never been applied and

this has largely contribute to determining the dramatic decline of *P. ferruginea* (see Coppa, 2011; Coppa et al., 2015).

Regulators justified such low levels speaking of the large size of the MPA, of the scarce resources (including human resources) available to exercise day-to-day enforcement and also of the fear of retaliation by fishermen if sanctions were applied.

#### *Regulators' calculative motivations*

The fear of losing political power and re-election opportunities was considered by three regulators as a reason for delaying certain administrative decisions (Regulator 1, Regulator 2 and Regulator 5). As key management decisions are made by the politicians, it is possible for powerful/large groups to redirect management bodies' decisions away from the public interest and towards private ones. This is clearly an example of regulatory capture.

“It is also a political question considering that all the administrations do not want to impose stringent control to avoid losing the electorate” (Sea-user 1).

Even the delay for the entry into force of the MPA Regulation was considered by some a product of micro-political choices, i.e. a way to avoid losing the votes of the fishermen who constitute an important part of the electorate (Regulator 2).

Also sea users criticized the short-term political gains of regulatory bodies, not only at the local level pointing out that many of the decision-making roles are assigned to individuals for political reasons rather than competence and expertise at higher levels of decision-making.

#### *Sea users Social motivations*

“The expression they [local seas-users] use is *imbburrai*, meaning to gather the butter from the milk, that is to say gather all the resources’ richness...without thinking about future generations, about the environment because there is the idea that the sea is an infinite resource that reproduces itself” (Regulator 2).

“Here we are in a wild status because we are not real fishermen but improvised ones. Cabras’ culture is more lagunar than maritime. There is no tradition of generations and generations of sea fishermen. The real fisherman is someone who leaves something for tomorrow. Here we do not think about tomorrow” (Sea-user 3).

Both regulators and fishermen agreed that the majority of active fishermen, rather than understanding the sea as a common good to be managed cooperatively, still consider it as an open-access space for resource appropriation; this assumption fully agrees with the results of biological studies that showed the stocks decline both of sea urchins and commercial fishes. Environmental sustainability considerations and especially concerns for future generations seem lacking among the fishermen. Although this understanding of the sea is dated as scientific studies have amply demonstrated declines of marine ecosystems due to over-exploitation (e.g. Worm *et al.*, 2006; Halpern *et al.*, 2008) and international laws, such as the United Nations Convention on the Law of the Sea 1982, have raised legal questions related to our collective responsibilities over the marine environment, the sense of the sea as *mare nullius* remains strong in the case study area. Some of the interviewees attributed this sea-users’ perception to the young maritime culture/tradition in the area because the population was, until recently, primarily relying on agriculture and those who fished in the past used more intensively the local lagoon in

Cabras. Indeed, it was only after WW2 that fishing efforts were directed to the sea (Camedda *et al.*, 2010).

Another cultural trait that was self-criticised by fishermen was the lack of any cooperative behaviour and the inability to self-regulate. “The fishermen are a group of drifters. If we were all united, imagine what a powerful group we will form!” (Sea-user 1). This lack of gregarious behaviour means that there is lack of trust between fishermen so that “you live in anxiety because you do not know if the next day your fishing nets are still there” (Sea-user 3). Also, sea-users mention that they tend not to report illegal activity because of the fear of retaliation from other fishermen “Sometimes there is fear of retaliation...a burned car. This happened to me this year” (Sea-user 4). Although there is a large number of fishing cooperatives (over 20), fishermen stated that each operates on its own because of the unwillingness to cooperate.

Finally, as sea-users had accused the regulators of inertia, similarly the regulators accused the fishermen of lacking interest in participating in meetings regarding the management of MPAs. This was attributed by regulators to inertia rather than, for example, perceived marginalization due to different ways of expressing and communicating different types of knowledge. This inertia negatively impacted on sea-users’ environmental law knowledge.

#### *Sea users’ normative motivations*

During the interviews, not all sea-users provided a full assessment of the management rules in place but those who did, much like regulators, had a positive perception of the regulations including the sanctioning system. Indeed, three sea-users were aware of the

types of sanctions in place in relation to their activities and agreed with the existing mixture of civil and criminal sanctions. Much like regulators, fishermen criticized more heavily the application of the regulations pointing to the lack of environmental information and education as well as the lack of exercise of enforcement duties by regulators. The perceived lack of environmental information and education was discussed:

“Besides enforcement, environmental education is needed” (Sea-user 7)

All sea-users interviewed displayed adequate knowledge of the norms that apply to their specific sectors but had little awareness of other norms or conservation designations overlapping with the MPA. If for regulators, the primary cause for sea-users' lack of environmental knowledge was their inertia to participate in decision-making fora and other meetings centred on environmental regulations, for sea-users their environmental law ignorance was due to the lack of availability of environmental information. So, if regulators pointed to social motivations (cultural inertia), sea-users pointed to a normative motivation (difficulty of accessing environmental information and exercising this procedural right) to explain their knowledge gap.

#### *Sea-users' calculative motivations*

Sea-users and regulators pointed out that the fisheries sector tend to focus on short term economic gains. This was exemplified in a number of ways. It was stated that “90% of the illegal fishermen are local people who are aware of the existence of the MPA”, so illegal behaviour is not necessarily due to lack of knowledge of protection measures but to a strategic decision to unsustainably appropriate resources (commercial fisherman).

This point can also be confirmed by the authors' experience: the poachers seen during biological monitoring campaigns were mainly local citizens that knew their activities were illegal. Secondly, they pointed out that “fishermen cooperatives are all fake, they are a way to have easy access to funding” (Sea-user 3) and that when subsidies were given to begin fish-tourism activities, many obtained them but, as there were no real checks on how the money was spent, very few actually carried out the activities, selling their boats after a brief period of time. Today only two fishermen (out of 17 that secured the subsidies) keep the fishing-tourism business alive.

A comparison between the MPA and the lagoon was also made to illustrate the importance of short-term economic benefits for sea-users. The fact that the lagoon of Cabras is effectively self-monitored while the sea is not is partly due to commercial reasons. “We found ourselves in Cagliari with our mullet caught in the lagoon priced at 5 euros and that illegally caught [in the lagoon] priced at 3 euros. This is why in the lagoon there is a stringent self-monitoring system [to avoid losing out to illegal fishermen]” (Sea-user 1).

Finally, the issue of the black market, pointed out above, was considered by regulators a cause of sea-users' short-term behaviour, as clearly expressed by Regulator 1: “Many fishermen keep fishing at unsustainable levels because they are selling their products in the black market”.

The results of the interviews indicate multiple, inter-linked reasons at the roots of non-compliance. Most of these reasons were acknowledged by both regulators and sea-users. These are summarised under boxed themes and their causal links identified in Figure 4. The key social motivations are cultural inertia, lack of trust, environmental knowledge

gap and lack of a maritime tradition leading to an understanding of the sea as *mare nullius*. The key calculative motivations are political short-termism of the local administration and economic short-termism of the sea-users. The key normative causes, de-legitimising the governance system in the eyes of both regulators and sea-users, are the perceived politicisation of the administration, the lack of institutional coordination, the enforcement gap and the existence of a black market. As Figure 4 shows, many of these motivations cross-cut categories as they are the product of multiple factors. For example, sea-users economic short-termism can be attributed to both the existence of a black market and also to lack of environmental knowledge and awareness. Similarly the enforcement gap can be attributed to scarce resources and the large size of the MPA but also to the fear of retaliation by sea-users if sanctions are applied and to the regulators' inertia to operate.

## DISCUSSION

Understanding and explaining the ineffectiveness of MPAs is a difficult task considering they are complex social-ecological systems, thus requiring a multi-disciplinary study and a close mapping of the causes at the root of the problem. This study has attempted to show the importance of employing a multi-disciplinary approach to analyses of MPAs effectiveness, building on biological and socio-legal expertise. The biological results have demonstrated that anthropogenic factors (primarily over-exploitation of resources) are the basis of the biological ineffectiveness of Sinis MPA. The socio-legal study has attempted to understand in detail and categorize non-compliance motivations of the actors involved, to outline a number of inter-linked causes leading to non-compliance and to provide policy

recommendations drawn from regulation theory. In introducing and applying current insights of critical regulation theory and compliance studies to MPAs, this study has added a new theoretical and analytical framework to the existing literature on MPAs governance. But it has also added to the compliance literature in mapping non-compliance motivations not only of regulatees but also of regulators. Compliance studies have primarily focused on businesses, firms or individual regulatees but in cases such as the one reported above, also regulators need to be the subject of analysis as non-compliance is happening on all fronts of the regulatory spectrum.

Clearly, as Parker and Nielsen (2011) argue, “there are no likely to be many simple ‘lessons’ and policy prescriptions from empirical research that seriously seeks to explain compliance”. Indeed in relation to the Sinis MPA the policy recommendation tha we offer below are not as prescriptive as policy makers may wish them to be but at hte same time provide some avenues of reflection for regulatory reform.

Even if the findings of biological research point to the need to increase surveillance and enforcement levels in the short-term to prevent the extinction of endangered populations of protected species (i.e. *Patella ferruginea*) or overexploited stocks (i.e. commercial fish and sea urchin), the socio-legal research shows that this cannot be the most effective long-term solution in a complex scenario such as Sinis MPA. This is because, as pointed out by advocates of the “really responsive regulation” approach (Baldwin and Black, 2008), regulation also needs to be responsive to cognitive and operative frames of regulatees, so if enforcement translates into an increment of punitive strategies, the underlying cultural problems identified above will not be addressed. Indeed, more external surveillance and enforcement will



not raise environmental knowledge, favour the promotion of trust or decrease inertia; rather, it is likely to increase levels of mistrust distancing even more the regulators from the sea-users.

Also, enforcement measures are likely to become of secondary importance if co-operation and trust among citizens, sea-users, scientists and regulators is achieved. All those present at the workshops agree with this sentiment. To do so, efforts should be directed towards the building of trust, increasing environmental knowledge, sharing information and communication/coordination between actors and institutions at different governance levels, in a manner akin to Lodge's "empowering citizens" doctrine (Lodge 2004). In the case study area initial attempts to begin this work of communication and collaboration have been carried out by the authors of this paper both through a number of courses directed to regulators and through the dissemination of scientific results to the wider public. These activities have contributed to improve environmental knowledge and in the case of *Patella ferruginea* brought more awareness of its spatial distribution (Marra et al., forthcoming). The authors of this paper have also conducted a series of educational activities with local primary and secondary schools, funded by an ESRC Impact Accelerator Award.

However, educational activities and the building of collaborative platforms are unlikely to work instantaneously because of existing regulatory capture issues. The creation of independent oversight bodies therefore needs to be contemplated as a first step to increase transparency. In the longer term, once environmental stewardship has been built through pluriannual educational programmes, oversight through local participation can be advanced. Ideally, the independent oversight body should have statutory powers

and duties to monitor the performance of stakeholders and of the MPA, holding to account any person failing to carry out agreed actions by bringing this to the attention of regulators at the appropriate level of decision-making. A step has been taken towards improving the accountability and management of all Italian MPAs with the project ISEA (see: <http://www.progettoisea.it/>, last accessed 14 August 2015). The ISEA website includes all the conceptual maps on MPA management plans and the filling of a standard management form in order to increase the standardization of management measures and objectives of the MPAs across Italy. However, the extent to which the ISEA project can respond to accountability and transparency issues in full is questionable considering that it operates more as a reflexive tool for MPAs than as an oversight mechanism. Also, as will be recalled from above, the only institution that operates next to the management body is the 'Commissione di Riserva' but it is only a consultative body and has a rather exclusive membership. A stronger system to audit the quality of environmental reporting and implementation should be put in place and strategies to develop independent oversight bodies responsible of reviewing the environmental performance of MPAs should be discussed. These recommendations were discussed at the workshops and again the attendees were in agreement. However, more than a local agreement is needed in order to implement some of these suggestions. It is at the national level that the decision to create an independent oversight body can be made.

To sum up, the Sinis MPA is not an exceptional case of an MPA struggling to achieve its conservation goals. It has been indicated that a large number of MPAs in Italy (Guidetti et al. 2008) and in the world (e.g. Rife et al., 2013; Advani et al., 2015) are paper parks. Reasons for failures need to be analysed carefully and single solutions at the

end of the regulatory spectrum (such as increasing enforcement levels) may not always be the most appropriate in the long run. Forging long-term solutions for understanding and addressing the problem of paper parks requires working at wide structural levels, first of all by providing a biological assessment of biodiversity in the area, secondly by identifying all the key actors, institutions and factors impacting on the effectiveness of specific MPAs. In the case of the Sinis MPA, the key actors are fishermen and regional and local regulators because other sea-users have a modest impact on the biological resources of the area and regulators outside the region play a marginal role as both fishing and conservation activities are devolved to the Regions in Italy. Other MPAs in other parts of the world will have a different composition of actors, institutions and factors and therefore qualitative studies of this kind need always to be context specific to reflect the precise micro and macro variables of the MPA under research. Through its multi-disciplinary lenses and through the application of critical regulation theory to MPAs governance, the above study has provided a detailed picture showing the fragmentation and complexity of a particular MPA. However, it is argued that the type of analysis carried out may be useful for the study of other MPAs experiencing similar compliance issues..

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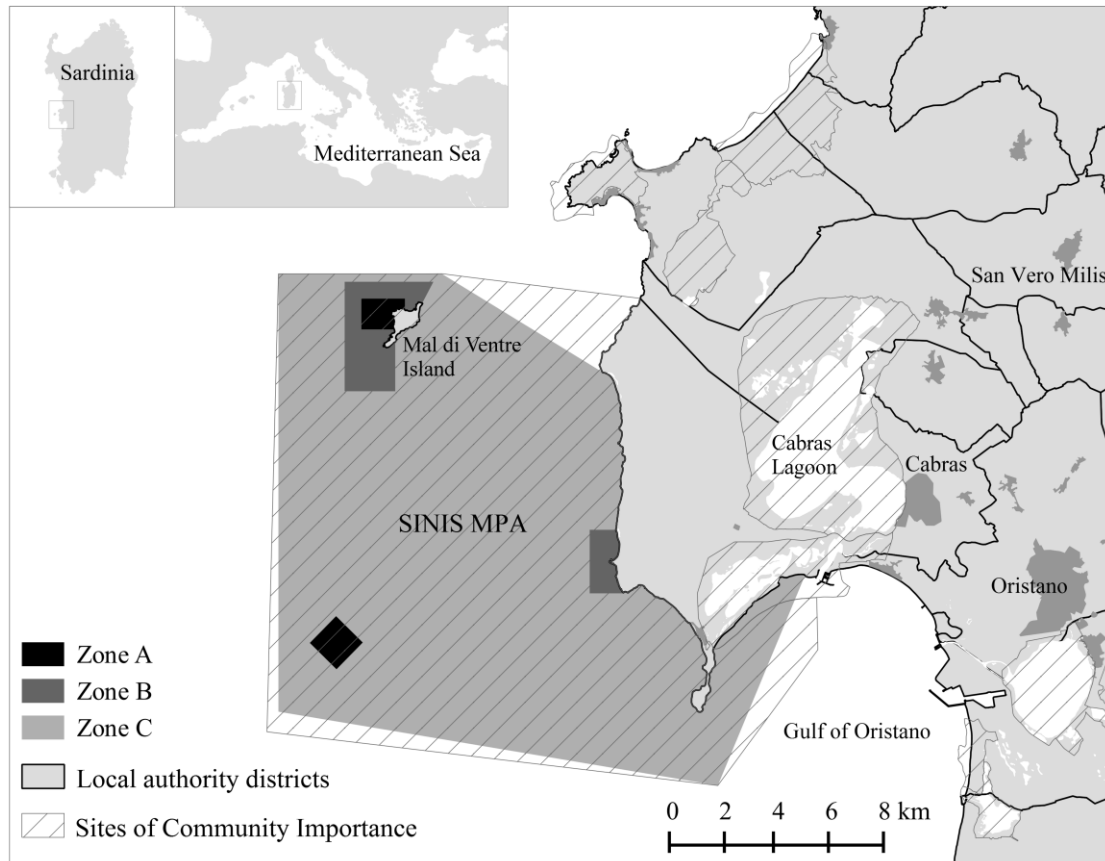
Decreto Ministeriale 20.07.2011 n.188 “Regolamento recante la disciplina delle attività consentite nelle diverse zone dell'area marina protetta Penisola del Sinis - Isola di Mal di Ventre” (G.U. n. 267 del 16.11.2011) (cited in the text as decree 20/07/2011, n. 188)

Decreto Assessoriale n. 1553/DecA/40 del 28 ottobre 2014 (cited in the text as Decree 2014, n. 1553)



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**FIGURE 1**



**FIGURE 2**

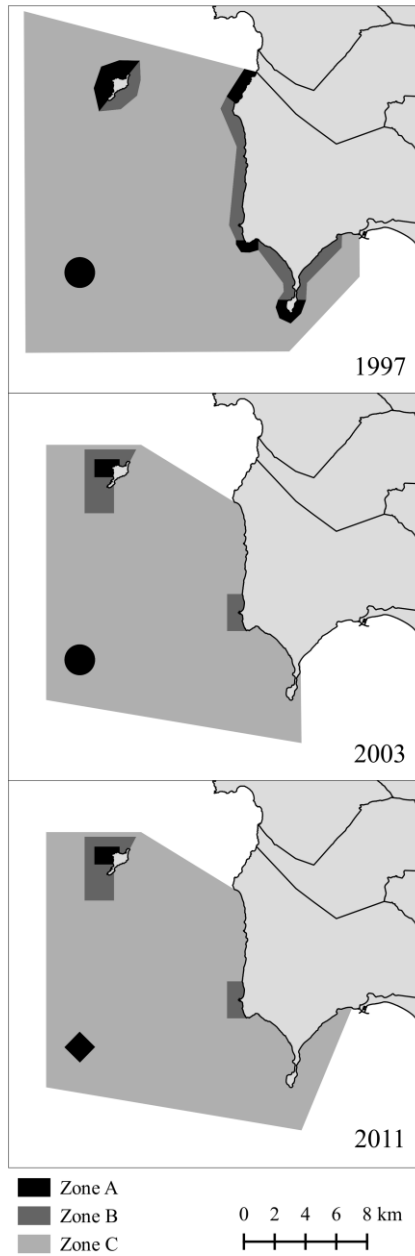


FIGURE 3

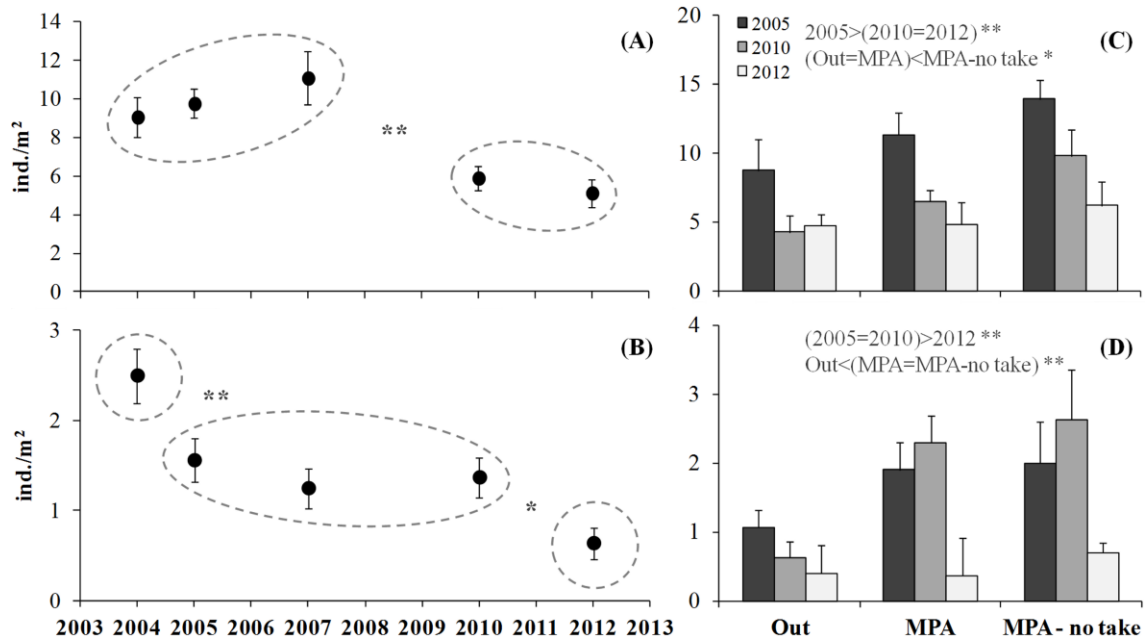


FIGURE 4

